Pressure container, particularly for frozen substances

The invention relates to a pressurised container for holding substances under pressure, in particular frozen substances, having an outlet valve, which is adjustable between a closed position and an opened position for dispensing the substance, and which has a sealing element, disposed in a sealing seat, for sealing in the closed state of the outlet valve.

Pressure containers or cans for holding and intentionally discharging gaseous substances, aerosols, or relatively high-viscosity substances, such as whipped cream, have already been known for a long time, as are many outlet valves used with them. Because of the compressibility of these substances, the sometimes relatively low pressure, and the defined temperature range in which these pressurised containers are used, comparatively simple outlet valves generally suffice and can optionally be combined with an overpressure valve, to make it possible to reduce dangerous overpressures in the interior of the can, for instance if the contents heat up excessively.

There is a need to be able to put even frozen substances or high-viscosity substances onto the market in pressurised containers, which requires a high internal pressure in the container and/or a large outlet cross section, to enable the substance to be dispensed in the desired quantity within a defined length of time. The problem then arises for one thing that the large opening cross section together with a high internal pressure in the can leads to very sharply rising actuation forces, which can no longer be handled using simple

push buttons of the kind known from conventional spray cans. At the same time, the problem arises that if there is a change in the viscosity of the product stored in the container, as can occur for instance upon heating up or if there is a change in the aggregate state, such as thawing of a frozen product, the high internal pressure of the can and/or the large outlet cross section can have the effect that the substance is discharged so vehemently from the container that not only must unpleasant contamination of the surroundings be feared, but in the worst case even injuries can occur, for instance if children put the spray valve of such a container, with thawed contents, into their mouth and open the outlet valve.

The object of the present invention is consequently to create a pressurised container with an outlet valve that makes improved safety possible with substances whose viscosity varies in the incident temperature range and/or that makes improved user control possible.

A first embodiment according to the invention for attaining the object provides that heating and in particular a change in the aggregate state of the substance and an attendant or otherwise-occurring reduction in the viscosity of the substance brings about an increase in the flow velocity in the region of the sealing element when the outlet valve is open, along with an increased pressure drop at the sealing element, as a result of which a force that is substantially increased compared to the normal state is exerted in the extraction direction on the sealing element, and/or the reduced viscosity, with the aid of at least one connection provided between the sealing seat and the container interior

and having a small cross-sectional area, brings about an increased pressure in the sealing seat and thereby an increased force on the sealing element in a direction out of its sealing seat; the resultant force on the sealing element, if a certain minimum viscosity of the substance fails to be attained, is suitable for extracting the sealing element from its sealing seat, and the detached sealing element closes or substantially reduces an opening cross section.

The embodiment according to the invention offers a safety function, which prevents the outlet from being uncovered if the viscosity of the substance stored under pressure in the pressurised container has decreased, so that even after the outlet valve is actuated there is no risk of uncontrolled contamination of the environment or even of injury to the user.

The present invention makes us of the change in viscosity conditions in the event of heating and in particular in the event of a change in the aggregate state, such as thawing, in that by means of the altered conditions of pressure and force on the sealing element, this sealing element can be detached from its seat and used for securely closing a cross section. The change in the pressure and force conditions is especially serious if there is a change in the aggregate state, although in the case of ice cream, for instance, considerable changes in viscosity can already occur even before the product thaws, or in other substances in the range of the liquid aggregate state and especially substances with non-Newtonian properties, changes in viscosity occur that necessitate tripping the safety device. Even chemical reactions could cause such a change in viscosity.

The detachment of the sealing element from its sealing seat can be attained by means of the pressure drop or by the intentional provision of connections; preferably both provisions are employed in combination, so that even with substances of complex behaviour upon temperature changes, the sealing element can be intentionally detached if a metered, intentional discharge of the substance is no longer assured because of the altered viscosity properties.

In a preferred embodiment of the invention, it is provided that the sealing element is embodied annularly, and the sealing seat is in the form of an annular groove; with such a seal, comparatively large opening cross sections can be sealed off without great effort, and the internal pressure of the container can act on the sealing element via the connection and the annular groove. It is especially preferable to provide a plurality of connecting bores, distributed over the circumference between the sealing seat and the interior of the container and/or an annular conduit on the bottom of the sealing seat, the annular conduit being narrower than the sealing seat itself. These two provisions, individually or preferably in combination with one another, assure that the increased pressure that occurs upon a reduction in the viscosity of the substance will act uniformly on the sealing element, so that the sealing element can be pressed uniformly out of its seat without becoming canted; this is especially advantageous with sealing rings of a soft sealing material that are intrinsically not very stable.

The tripping point, that is, the viscosity at which the sealing element moves out of its seat, can be intentionally set by way of the number and cross section of the connecting bores. For instance, the connecting bores in a frozen substance can be closed by the formation of ice crystals, so that the pressure cannot force the sealing element out of its seat, while after thawing and the attendant disappearance of the crystals, the internal pressure of the container can act on the sealing element via the connections and optionally the annular conduit. In higher-viscosity substances, pressure drops can be intentionally set by way of the cross sections of the connections without changing the aggregate state; these pressure drops do not allow a sufficient pressure in the sealing seat to force the sealing element out until a certain viscosity fails to be attained.

The other provision, preferably employed in combination with the connections, of generating a pressure drop at the sealing element that builds up a tensile force on the sealing element to move it out of its seat is preferably attained in such a way that the sealing element protrudes from its seat and protrudes obliquely, in relative terms, into the opened flow cross section, and its contour defines the narrowest point of the flow cross section. In this way, solely by way of the pressure drop, an especially high resultant force on the sealing element can be generated, and this force increases as the viscosity decreases, since for a certain internal pressure of the can, with reduced viscosity, the flow velocity in the region of the sealing point and thus the pressure drop and hence also the extraction force acting on the sealing element increase.

In the closed state, the sealing element preferably co-operates with a conical contact face, which in the opened state forms the flank of the flow cross section opposite the sealing element. Preferably, the narrowest point of the flow cross section is contoured in nozzle-like fashion, for example similarly to a venturi nozzle, to facilitate dispensing the substance on the one hand, and on the other to assure a defined pressure drop.

A sealing ring of disk shape or with a substantially rectangular cross section, which preferably has rounded or chamfered edges and with an edge protruding from its seat defines the contour of the narrowest point, is especially expedient. With the aid of the rounded edge, the desired nozzle contour can be achieved very easily, and preferably the opposed contact face is embodied accordingly.

An embodiment of the invention in which the outlet valve is embodied as a multiple-stage valve and has at least two opening cross sections that open one after the other, each with an associated sealing element, and at least the sealing element of the cross section that opens first is embodied so as to be in captive fashion from its seat if a minimum viscosity fails to be attained, can be expedient. An embodiment having a multiple-stage valve can be useful in order to enable successively uncovering an overall larger opening cross section, and the actuation of the second stage is simplified, if a frozen structure is for instance loosened up by opening the first cross section and by the ensuing flowing motion. As a precaution, all the sealing elements should be embodied in captive fashion as described above, since if very major force is expended, it could be possible

to open the second opening cross section as well, once the sealing element of the first opening cross section has become detached and closes an opening cross section provided there.

In an especially preferred embodiment of the invention, it is provided that the sealing element detached from its seat can be re-inserted into its seat by closure of the outlet valve. Depending on the substance, the container can still be used after being chilled down to the operating temperature again, and even in cases where usage is no longer recommended after thawing, as in the case of ice cream, this still makes it possible to empty the can before throwing it away, so that when disposed of, the container is no longer under pressure.

A structural embodiment of this kind of reversibly detachable sealing element provides that the sealing element comprises a disk of sealing material of relatively high rigidity or an annular disk with a rigid substrate and a sealing part mounted on the substrate, the substrate being guided in the extraction direction between its seat and its position that closes the opening cross section. The rigid substrate in conjunction with the guide assures that the sealing element can be returned to its seat in a defined way again by closure of the outlet valve, so that for instance after re-freezing, the outlet valve can be opened normally again. A guide can for instance be embodied such that the sealing element is guided axially on a central protrusion, which depending on the structural embodiment also forms the connection between a valve element, in which the seat or the contact face for the sealing element is provided, and a tappet for actuating the outlet valve.

A further embodiment according to the invention for attaining the object of the invention provides, preferably in combination with the safety function described above, that the sealing seat is provided in a valve element, which is movable in the direction of the interior of the can by a tappet element for opening the opening cross section, and the tappet element can be pressed down by a lever, whose lever arm comprises at least two parts that are fixed pivotably to one another and can be swivelled between a collapsed position of repose, in which they are preferably locked together, and an open, preferably likewise locked, operating position for lengthening the lever arm.

The hinged lever construction offers the advantage that in the open state, a longer lever travel is available, and actuation can be done by grasping the second lever part with the user's hand, making it easier to introduce force. At the same time, the lever can be folded into the position of repose and the container can be closed, for instance with a plastic cap whose outer diameter need be no greater, or only insignificantly greater, than the diameter of the container. This has major advantages in terms of space, especially when a plurality of containers are packed in cardboard boxes.

An especially preferred lever construction provides that a first lever arm part is pivotably connected laterally of the tappet element to a part connected solidly to the container and acts on a radial protrusion via pressure elements. Such a construction assures a short lever arm length between the pivot point attached to the container and the engagement points of the pressure elements, so that especially low opening forces can be attained. An especially expedient

embodiment provides that the radial protrusion is formed onto a nozzle top unit that is seated on the tappet element. A nozzle top unit is for instance provided for ice cream, so that it can be dispensed in some structured way, and under some circumstances even in a special shape. It is expedient in this respect that the nozzle top unit is held above the tappet by two diametrically opposed pressure elements, so that for securing the nozzle top unit, no further detent connections or other connecting elements are necessary and a secure hold is still assured, since axial forces act on the nozzle top unit only when the lever is pressed down and the outlet valve is thus opened. In an especially preferred refinement of the lever, it is provided that the two lever arm parts are embodied in hooplike fashion, and the first lever arm part surrounds the nozzle top unit and/or the tappet element in both positions, and the second lever arm part surrounds the nozzle top unit and/or the tappet element in the position of repose. The hooplike embodiment on the one hand makes a sufficiently stiff design of the lever possible so that the forces exerted by the user can be transmitted, and on the other is especially space-saving, again in view of the need to be able to close the container in the region of the nozzle top unit with a plastic cap or the like whose diameter exceeds the outer diameter of the container only insignificantly, if at all.

In still another preferred embodiment of the invention, the outlet valve can have, in addition to a first opening cross section, at least one further opening cross section, which can be uncovered in order to facilitate filling of the container. This further opening cross section can for instance be the opening cross section of a multiple-stage

valve, already mentioned above, but it is also conceivable for the further opening cross section to be opened solely for the filling operation; that is, after filling, the at least one further opening cross section remains closed even when the outlet valve is actuated. This can also be attained for instance by providing that the opening stroke of the outlet valve in a normal evacuation operation is not sufficient to uncover the second cross section. Conversely, in the filling operation, optionally with the top partly removed, a long enough stroke can be executed to uncover both opening cross sections and thus make it easier to introduce the product. In this process, the first opening cross section is uncovered first, and then the at least one further opening cross section is uncovered in succession, in the manner of a multiple-stage valve.

Exemplary embodiments of the invention are addressed in further detail below in conjunction with the accompanying drawings. Shown are:

Fig. 1 a cross section of a top region of a pressurised container in the closed state;

Fig. 2 a cross section similar to Fig. 1, with a slightly modified outlet valve and with an actuating lever unlocked in advance;

Fig. 3 a cross section of the top region of Fig. 2, with the actuation

lever folded open into the operating position;

Fig. 4 a cross section of the top region of Figs. 2 and 3 with the outlet valve open;

Fig. 5 a cross section of the top region of Figs. 2-4 with the safety function tripped;

Fig. 6 a cross section of the embodiment of Fig. 1, with the lever contour sketched in;

Fig. 7 a cross section of the embodiment of Fig. 6, with the outlet valve open;

Fig. 8 an enlarged cross section of the sealing region of a further embodiment of an outlet valve; and

Fig. 9 a cross section of a top region of a pressurised container with two opening cross sections.

In Fig. 1, the top region of a pressurised container 10, which is provided with an outlet valve 12 for dispensing the pressurised container contents 14, is shown in cross section. In the exemplary embodiment shown the pressurised container

10 is used to hold frozen ice cream; that is, as a rule, the container is deeply frozen, and the contents of the can are of very high viscosity, corresponding to the substance of ice cream in the frozen state. The container 10 is at a high pressure, which is suitable for allowing such a material to be dispensed from the outlet valve.

The outlet valve 12 substantially comprises a valve housing 16, which is connected solidly to the pressurised container 10 with the interposition of a suitable seal 18; a movable valve element 20 with a disc-like sealing element 24, disposed in a sealing seat 22, for sealing off the outlet valve 12 from the internal pressure in the container in the closed state; a sleevelike tappet element 26, connected to the valve element 20; a nozzle top unit 28 seated on the tappet element 26; and an actuating lever 30, which in a manner to be described in further detail hereinafter acts on the tappet element 26 and thus on the valve element 20 via the nozzle top unit 28. Between the tappet element 26 and the valve housing 16, a helical spring 32 is also provided, as a restoring element, which after the actuating lever 30 is released returns the tappet element 26 into the position of repose; the outlet valve 12 is closed with reinforcement from the internal pressure of the container. Once the internal pressure of the container is reduced, the helical spring 32 assures that no residues from the interior of the container can escape via the seal.

Because of the high viscosity of the container contents, the outlet valve 12 in the open state (see Fig. 4) has a comparatively large opening cross section, so that a satisfactory volume of the contents of the container 10 can

be dispensed with in a certain length of time, at the pressure available. As a result, a comparatively large-area valve element 20 is required, with a sealing point 34 of relatively large diameter, which is defined by a circumferential edge 36 of the sealing element 24 and by a conical contact face 38 on the valve housing 16. The valve element 20 itself is pointed in shape, so that it can more easily penetrate the frozen composition 14 upon actuation of the outlet valve 12.

Nevertheless, because of the large projection area of the valve element 20, a high actuating force on the tappet element 26 is necessary, if the outlet valve 12 is to be opened counter to the internal pressure. An actuating lever 30 is therefore provided, which comprises a first lever arm part 40 and a second lever arm part 42, both embodied in hooplike fashion and, for instance in the shipment position shown in Fig. 1, surrounding the nozzle top unit 28. In this position shown, the top region can be covered by a plastic cap (not shown), which can be snapped onto the pressurised container 10 at an annular bead 44, and whose outer diameter exceeds the outer diameter of the pressurised container only slightly, if at all, so that the pressurised containers can be packaged in a space-saving way.

The first lever arm part 40, via a hoop 46, engages a slot 48 in the valve housing 16, so that it is swivelably supported about this pivot point. The second lever arm part 42 is seated with two lateral snap-on hoops 50 on pivot pegs 52, which are provided on the first lever arm part 40 and define the hinged pivot point of the lever arm 30. As can be seen from Figs. 6 and 7, the first lever arm part has pressure

elements 54, embodied in the region of the lever bifurcation, which at a point marked 56 rest on a radially protruding edge 58 of the nozzle top unit 28.

For folding the actuating lever 30 open, this lever can easily be raised, in the collapsed, locked state, to the position shown in Fig. 2, and further swivelling open can be made possible to enable removing the nozzle top unit from the tappet element 26 for cleaning it or for replacing it with a different nozzle top unit having a differently embodied through opening. As already noted, the two lever arm parts 40, 42 are easily detachable locked together but can be detached from one another without problems and folded open, by swivelling about the pivot pins 52, into the operating position shown in Fig. 3; in this state, they are locked to one another, preferably again detachably, by suitable detent elements. In this state, the user can exert a large force on the second lever arm part 42 with the palm of his hand, and this force is reinforced by the lever arm in accordance with the lever arm ratio.

Via the pressure elements 54 of the first lever arm part 40, the lever 30 acts via the contact point 56 on the radial protrusion 58 of the nozzle top unit 28, and this radial protrusion in turn rests on a radial shoulder 60 of the tappet element 26. Via the sleevelike tappet element 26, the actuating forces are transmitted onward to the valve element 20, via three struts 62 that converse obliquely toward the middle and via a connecting portion 64 adjoining them centrally. Once the internal pressure of the can is overcome, the valve element, when the actuating force is exerted, is moved out of the position shown in Fig. 3 into the dispensing

position shown in Fig. 4, in which a large outlet cross section is uncovered between the conical contact face 38 and the sealing edge 36 of the sealing element 24. As a rule, the actuating force drops sharply as soon as the sealing element has lifted from its opposed contact face 38.

In the state shown both in Fig. 4 and in Fig. 7, the substance 14 stored in the container can be discharged through the opening cross section in the region of the sealing point 34, past the struts 62, into the hollow tappet element 26 and from there into the nozzle top unit 28 and onward, through an outlet opening 66, which in this exemplary embodiment is shown in star-shaped form. The nozzle top unit 28, placed only loosely on the tappet element 26, is held in position in the discharge position by the actuating lever 30, even under the pressure forces acting on it.

After use, the lever can be collapsed again, and the nozzle top unit 28 can be removed for cleaning. After cleaning and collapsing into the position shown in Fig. 1, a protective cap can be snapped back onto the annular bead 44. During the dispensing of the container contents, the tappet element 26 is sealed off from the valve housing 16 with the aid of a sealing ring 68, which upon the motion of the tappet element 26 slides along a cylindrical wall 70 of the valve housing 16. In the exemplary embodiment shown, the cylindrical wall 70 and the outer wall of the valve housing 16 form an annular hollow chamber 72, in which part of the helical spring 32 is disposed.

While the lever construction in conjunction with the shaping of the valve element 20 makes opening the outlet valve 12

easier, the particular structural embodiment of the sealing element 24 and its sealing seat 22 assures a safety function, which prevents the container contents, if there is a substantial reduction in viscosity, such as after ice cream has thawed, from escaping from the outlet opening 66 uncontrollably fast after the outlet valve 12 is opened. To that end, it is provided that if a certain minimum viscosity of the substance 14 fails to be attained, the sealing element 24 will detach from its sealing seat 22 upon opening of the outlet valve 12 and will remain in its sealed-off position, as shown in Fig. 5, without following the valve element 20. In this position, the sealing element 24 is pressed against the conical contact face 38 by the internal pressure of the can, so that the sealing point 34 remains closed, and no substance can escape from the container. The sealing element 24 has sufficient rigidity so that in this state it undergoes no substantial changes of shape; either it can comprise a suitable hard sealing material, or it has a substrate on which the actual seal with the sealing edge 36 is disposed. The sealing element 24 is guided axially on the connecting element 64, so that it cannot make a change of position in the radial direction that could threaten the sealing in this position.

In the embodiment shown in Figs. 1, 6 and 7, the detachment of the sealing element 24 from its sealing seat 22 if the minimum viscosity fails to be attained is achieved by the structural embodiment in the region of the sealing point 34 and by a defined retention force between the sealing element 24 and the sealing seat 22. While with a frozen substance for instance, this substance can pass through the opening cross section only at a low flow velocity, and accordingly only a

minimal pressure drop occurs, if the viscosity is reduced and the flow velocity is correspondingly higher, a pressure drop is created which can be varied by means of structural provisions, such as the conicity of the contact face, the extent of protrusion of the sealing element 24 from the sealing seat 22, and the contouring of both the sealing edge 36 and the contact face 38. By way of the effective surface area of the sealing element 24 downstream of the sealing point 34, with the resultant underpressure, a certain pressure on the sealing element 24 to force it out of the sealing seat 22 can also be generated purposefully. These structural factors and the retention force of the sealing element 24 in the sealing seat 22 are adapted such that if the viscosity falls below a minimum level, for instance if the contents 14 of the container thaw, the resulting forces from the pressure drop acting on the sealing element 24 move the sealing element, counter to its clamping force, out of the sealing seat 22 into the safety position shown in Fig. 5. Then if at all, only in the very first instant of the pressing down of the valve element 20 does any slight passage of the substance 14 occur into the interior of the valve housing 16 or the tappet element 26.

Since it can be difficult to adapt the structural details to attain tripping of the safety function when certain parameters are attained, it can be useful in addition or alternatively to the effect described above to provide at least one but preferably a plurality of connecting bores 74 in the valve element, which connect the sealing seat 22 with the interior of the pressurised container 10. The diameter and geometry of the at least one connecting bore 74 (see Figs. 2-5) are selected such that in the frozen state of the

substance 14, for instance, the opening cross sections are closed by crystal formation, so that the internal pressure of the can cannot act in the sealing seat 22 on the sealing element 24. In the frozen state, upon actuation of the actuating lever 30, the dispensing position shown in Fig. 4 is consequently reached.

If a frozen substance thaws, or if there is a substantial decrease in viscosity of a substance that as a rule begins in a higher-viscosity state, the internal pressure of the can container act on the sealing element 24 via the connecting bores 74 in the valve element, so that the detachment of the sealing element 24 from its seat 22 is either reinforced or is accomplished solely by the internal pressure of the can, if the substance 14 has thawed or a certain minimum viscosity has failed to be attained. In this embodiment, it is possible to attain the safety position shown in Fig. 5, without any escape of the substance via the sealing point 34. As already noted, the two effects of the connecting bores that self-seal because of the high-viscosity substance and the targeted oncoming flow and the generation of a pressure drop can preferably be combined, to achieve a defined detachment of the sealing element 24.

Guiding the sealing element 24 on the connecting element 64 offers the advantage not only of secure sealing if the valve element 20 moves toward the interior of the can but also the advantage that after the actuating lever 30 has been released, the valve element 20 can be returned to its outset position again under the influence of the restoring spring 32 and in particular of the internal pressure of the can as well, and in this process the sealing element 24 is also

pressed into its sealing seat 22. A chamfer 36 on the outer circumference of the sealing seat and/or on the underside of the sealing element facilitates returning the sealing element 24 to its seat 22. The connecting bores or other openings between the sealing seat 22 and the container interior are also advantageous in this respect, because through their opening cross sections, the substance 14, which in the safety position of Fig. 5 can collect between the sealing element 24 and its seat 22, can easily be forced into the container interior. It is conceivable, after subsequent chilling of the pressurised container 10 and attainment of the requisite minimum viscosity, to perform a normal opening operation again and to withdraw the substance 14 from the pressurised container 10 in the usual and desired way.

While in the embodiments shown in Figs. 1-7, with a reversible sealing element 24, are preferred in many cases once the safety function has been tripped, either to enable further use of the container contents after re-chilling or at least to enable evacuation to reduce the pressure before the container is disposed of, non-reversible embodiments are also conceivable, in which after the safety function has been tripped an opening cross section remains permanently closed, for instance to assure that a thawed food, which may have become spoiled, can no longer be used.

An embodiment of an outlet valve 112 of this kind is shown in Fig. 8; for the sake of simplicity, only the region of the sealing point 134 and the valve element 120 is shown, while the remaining structural parts can be like those of the embodiment shown in Figs. 1-7. In the embodiment of Fig. 8, a sealing element 124 of substantially rectangular cross

section and with a rounded sealing edge 136 is seated in a sealing seat 122, with an annular conduit 123 disposed on the bottom of the sealing seat; via at least one connecting bore 174, this annular conduit is in communication with the container interior. Once again, the sealing in the closed state is effected by contact of the sealing edge 136 with a conical contact face 138. Unlike the embodiments shown in Figs. 1-7, the sealing element 124 entirely comprises a relatively soft material and is not guided in any special way on the valve element 120. If the safety function comes to be tripped, once again by the intentional utilisation of a pressure drop and/or the pressure build-up through the connecting bores 174, with the annular conduit 123 making a uniform pressure build-up possible, which is especially advantageous with the soft sealing element 124, the sealing element 124 is pressed, after its detachment from the sealing seat 122, into a gap 102 between the valve housing 116 and the valve element 120; as a rule, this gap represents the flow cross section for the substance to be dispensed. Because of its relatively soft nature, the sealing element is deformed under the influence of the internal pressure in the container in such a way that even after the valve element 120 is retracted, the sealing element 124 can no longer get into the sealing seat 122, and so the gap 102 remains permanently closed, and a discharge of the substance is no longer possible even after being chilled again. In this connection, it would also be conceivable to provide a small through opening in the region 102, for instance in the form of an axial conduit on the valve housing 116, which conduit assures slow evacuation of the container contents after the safety function has been tripped. It is also conceivable to provide this kind of intentional dispensing function in embodiments

of Figs. 1-7, for instance by means of a through opening between the valve element 20 and the connecting element 64.

The outlet valves described above can also be embodied with multiple steps; that is, it is conceivable, after the opening of the valve element 20, to open a further cross section in order to speed up the discharge and/or the introduction of the substance. In such an embodiment as well, a safety function can be desirable for both valve stages, although as a rule, opening the second valve stage for discharge under pressure necessitates a considerably greater expenditure of force if the first valve stage could not be opened or is closed after the safety function has been tripped.

In Fig. 9, one example of such a multiple-seat valve is shown, in the form of an outlet valve 212, which is quite similar in structure to the single-stage variants described above. Equivalent elements are therefore provided with the same reference numerals.

In a departure, the valve housing 16, in the region of the sealing point 184 of the first opening cross section, is not provided with an annular protrusion protruding obliquely into the interior of the can; instead, compared to the embodiments described above, it has a recessed sealing point 186, while the aforementioned first sealing point 184, for co-operation with the disk-like sealing element 24, is formed by a conical disk element 180. The conical disk has a second, annular sealing element 125, which co-operates with the second sealing point 186. The disk element 180 is also guided axially movably toward the interior of the can in an axial guide 182, which may be formed onto the valve housing 16.

The second opening cross section, which can be closed by the second sealing point 186 and the second sealing element 125, can, depending on the design of the lever mechanism described above and not shown here, and in conjunction with the position of the struts, be opened for rapid evacuation by depressing the tappet element 26. In the exemplary embodiment shown, however, the second opening cross section serves only to facilitate the process of filling the container with frozen ice cream. If the lever mechanism is removed and the nozzle top unit 28 is missing, it is in fact possible for the tappet 26 to be moved farther into the interior of the can, where because of the absence of internal pressure in the can the disk element 180 is moved into a terminal position in the axial guide 182, uncovering the second opening cross section into the container interior. If once it reaches the stop the tappet element 26 moves onward toward the interior of the can, then subsequently the first opening cross section in the region of the first sealing point 184 will also be uncovered, so that an especially large opening cross section for rapid filling is available. As soon as the container is under pressure and the lever mechanism with the nozzle top unit 28 has been installed, the second opening cross section remains closed because of the internal pressure in the can, and the stroke of the tappet element 26 is limited in such a way that the struts cannot act on the disk element 180.